

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-203993
(43)Date of publication of application : 09.08.1996

(51)Int.Cl. H01L 21/68
B65D 85/86
B65G 1/00

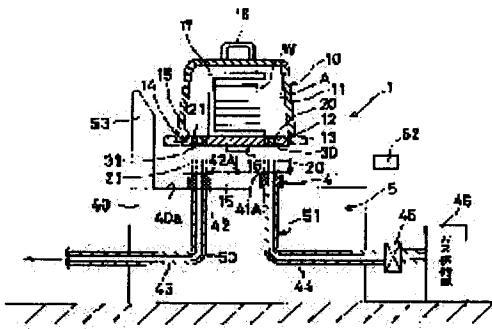
(21)Application number : 07-028654 (71)Applicant : SHINKO ELECTRIC CO LTD
(22)Date of filing : 24.01.1995 (72)Inventor : YAMASHITA TEPPEI
MURATA MASANAO
TANAKA MIKI
MORITA AKIYA

(54) GAS SUPPLY SYSTEM OF CARRIABLE AIRTIGHT CONTAINER

(57)Abstract:

PURPOSE: To reduce contamination for a semiconductor wafer in an airtight container by always flowing an economically constant amount of substitution gas.

CONSTITUTION: This gas supply system of a carriage airtight container is provided with an airtight container 10 which receives a semiconductor wafer W, of which the inside is airtightly closed with inactive gas atmosphere; inactive gas inside the airtight container 10; and a gas supplier 5 for supplying/ discharging. In the airtight container 10, there are provided one-way valves 30, 31 that allow the inactive gas to flow in the direction reverse to each other in a plurality of gas paths 20, 21 connecting this inside with the outside. Further, in the gas supplier, gas paths 50, 51 attachably or detachably corresponding to the respective gas paths 20, 21 are formed.



LEGAL STATUS

[Date of request for examination] 13.06.2001

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3617681

[Date of registration] 19.11.2004

[Number of appeal against examiner's decision
of rejection]

[Date of requesting appeal against examiner's
decision of rejection]

[Date of extinction of right]

*** NOTICES ***

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The portable-type sealing container which contains a semi-conductor wafer and is sealed by the inert gas ambient atmosphere in the interior, In the gas supply system of the portable-type sealing container which comes to prepare for the interior of this portable-type sealing container the gas transfer unit which supplies / exhausts inert gas to said sealing container While preparing the one-way valve which permits the flow of said inert gas, respectively in the direction which is mutually contrary to two or more gas passageways which open this interior and exterior for free passage, to said gas transfer unit The gas supply system of the portable-type sealing container characterized by forming the gas passageway whose attachment and detachment was enabled corresponding to said each gas passageway.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the gas supply system of a portable-type sealing container for inert gas to permute the inside of the portable-type sealing container used for a clean room.

[0002]

[Description of the Prior Art] For example, although manufacture of a semi-conductor is performed in the clean room which defecated the internal ambient atmosphere, in order to prevent adhesion of dust to a semi-conductor wafer, conveyance between the processes in a clean room contains the wafer cassette which contained the semi-conductor wafer concerned to the sealing container of a portable type, and performs it. Furthermore, in order to prevent growth of the oxide film by the natural oxidation of a semi-conductor wafer in recent years, it is nitrogen N2 about the internal ambient atmosphere of this sealing container. He is trying for inert gas, such as gas, to permute.

[0003] Thus, at recent years, it is nitrogen N2. Although a wafer cassette is put into the sealing container filled with gas and it is made to do conveyance and storage of Nitrogen N2 in a sealing container The concentration of gas may fall during conveyance standby and storage below at default value. In such a case, conventionally Nitrogen N2 Since it was carrying out [return / to the original location] after conveying the sealing container by which the concentration of gas fell to the gas purge station prepared in the clean room and re-purging it here Useless conveyance had to be performed and there was a problem that storage of a sealing container became complicated.

[0004]

[Problem(s) to be Solved by the Invention] In order to solve this problem, the artificer of the invention in this application has proposed [Japanese Patent Application No. / No. 128850 / four to] the gas supply system of the portable-type sealing container of a publication. The gas supply system of this portable-type sealing container makes the principal part the purge box which has space inside, the ramp which inserted in opening of this purge box and has sealed the opening concerned from the box inside, and the ** gas pipe and exhaust gas pipe which carry out opening to the interior of a purge box, changes opening of a purge box into a sealing condition, and the sealing container with a keylock is laid. And if the concentration of the inert gas in a sealing container (for example, nitrogen N2 gas) falls The keylock of this container is canceled, the variation rate of the lid is carried out only a little to a ramp side, and it is nitrogen N2 from distributed gas. While flowing in the building envelope of a purge box, and a container, gas By driving out the gas of the section to the exterior through an exhaust gas pipe among these, it is nitrogen N2 in a container. After permuting gas by the gas of high concentration (re-purge), again, a lid is locked by the keylock and the inside of a container is changed into a sealing condition.

[0005] however , it be N2 with high concentration about the inside of a sealing container at the gas supply system of the portable type sealing container of a conventional technique . even if it lock a lid and keep a lid in the state of sealing after gas permute , an adsorbate (impurity) begin

emission in a container from the device sections , such as a container inside and a keylock , a moisture and an oxygen density go up , and a problem of pollute a semi-conductor wafer be . [0006] It is nitrogen N2 continuously [in order to solve this problem] from a ** gas pipe.

Although continuing supplying gas is also considered In order the space of purge boxes other than a container is large and to lower unnecessary gas concentration Pure nitrogen N2 for a permutation Gas is needed in large quantities, and exhaust air of the unnecessary gas cannot be performed easily, either, but it is nitrogen N2. A gas supply system is enlarged by long duration starting and the purge box in the permutation of gas, and it will become uneconomical.

[0007] This invention was made in order to solve this problem, and it aims at offering the gas supply system of the portable-type sealing container which can reduce the contamination to the semi-conductor wafer in a sealing container by always passing the permutation gas of a constant rate economically.

[0008]

[Means for Solving the Problem] In order to solve the above-mentioned problem, in the gas supply system of the portable-type sealing container of this invention The portable-type sealing container which contains a semi-conductor wafer and is sealed by the inert gas ambient atmosphere in the interior, In the gas supply system of the portable-type sealing container which comes to prepare for the interior of this portable-type sealing container the gas transfer unit which supplies / exhausts inert gas to said sealing container While preparing the one-way valve which permits the flow of said inert gas, respectively in the direction which is mutually contrary to two or more gas passageways which open this interior and exterior for free passage, the gas passageway whose attachment and detachment was enabled corresponding to said each gas passageway is formed in said gas transfer unit.

[0009]

[Function] thus, in the gas supply system of the portable-type sealing container of this invention Each gas passageway of a sealing container is connected to each gas passageway of a gas transfer unit, respectively. Inert gas is supplied in a sealing container through an one-way valve from one gas passageway. Inert gas can be extremely permuted by ease and the short time only by being able to exhaust the unnecessary gas in a sealing container (air, water, etc.) outside from the gas passageway of another side through an one-way valve, and connecting each gas passageway of a sealing container to the gas passageway of a gas transfer unit.

[0010] Moreover, when picking out a portable-type sealing container from a gas transfer unit and conveying it, penetration of the unnecessary gas (air, water, etc.) from this gas passageway to into a container can be prevented by clausilium actuation of an one-way valve prepared in each gas passageway.

[0011]

[Example] Hereafter, the gas supply system of the portable-type sealing container which is one example of this invention is explained with reference to a drawing. Drawing of longitudinal section showing the gas supply structure of a system of a portable-type sealing container [in / in drawing 1 / this example], drawing 2 (a), and (b) are the important section enlarged drawings showing the configuration of the one-way valve of the gas supply system of the portable-type sealing container in this example.

[0012] In drawing 1 , 1 is the gas supply system of the portable-type sealing container arranged in the predetermined location in a clean room, and makes the principal part the gas transfer unit 5 and the sealing container 10 of a portable type. 11 is the body of the sealing container (POD) 10, and the flange 13 is formed in this opening 12. Moreover, while fitting of the lid 15 is carried out through the annular sealant 14 into the opening 12 of the sealing container 10, the building envelope A of the sealing container 10 is changed into the sealing condition by locking the lid keylock 16 prepared in this lid 15. Moreover, predetermined spacing is separated to the hoop direction which has a predetermined radius (having the phase of 180 degrees), and the gas-passageway tubing 20 and 21 which opens the building envelope A and the exterior of the sealing container 10 for free passage is formed in this lid 15. Each gas-passageway tubing 20 and 21 penetrated the lid 15 of each other in parallel, and is prolonged (the thickness of a lid 15 was penetrated and it has extended.), and one-way valves (check valve) 30 and 31 are arranged in

these interior, respectively. 16 is the handle prepared in the exterior of the sealing container 10. 17 is the wafer cassette which contained the semi-conductor wafer W, and it is laid, without closing each gas-passageway tubing 20 and 21 on the lid 15 in the building envelope A of the sealing container 10.

[0013] As shown in the gas-passageway tubing 20 at drawing 2 (a), the stepped hole 22 where minor diameter hole 22A, major-diameter hole 22B, and minor diameter hole 22C continue one by one toward an edge side from a lid 15 is formed, and spherical valve element 30B has sat down considering the inclined plane which connects this major-diameter hole 22B and minor diameter hole 22C as valve seat 30A of an one-way valve 30. Spherical valve element 31B of this one-way valve 30 is energized by valve seat 30A by the valve spring 23 stretched between step 22a of major-diameter hole 22B. Thereby, an one-way valve 30 permits the flow of the inert gas (nitrogen N2 gas) from the sealing container 10 outside to into a building envelope A, and prevents the reverse. Moreover, as shown in the gas-passageway tubing 21 at drawing 2 (b), the stepped hole 24 where minor diameter hole 24A, major-diameter hole 24B, and minor diameter hole 24C continue one by one toward an edge side from a lid 15 is formed, and spherical valve element 31B has sat down considering the inclined plane which connects this major-diameter hole 24B and minor diameter hole 24A as valve seat 31A of an one-way valve 31. Spherical valve element 31B of this one-way valve 31 is energized by valve seat 31A by the valve spring 25 stretched between step 31a of major-diameter hole 31B. Thereby, an one-way valve 31 is the nitrogen gas N2 from the building envelope A of the sealing container 10 to the exterior. The flow of gas is permitted and the reverse is prevented.

[0014] 40 is the supply base of a gas transfer unit 5, to this top-face 40a, predetermined spacing was separated to the hoop direction which has the same radius as gas supply lines 20 and 21 (having the phase of 180 degrees), the connector tubing 41 and 42 has projected, respectively, and the annular sealants 41A and 42A are formed in each of this connector tubing 41 and 42 edges, respectively. As for this connector tubing 42, the connector tubing 42 minds [which is not illustrated] the ** gas pipe 44 and the closing motion valve 45 through an exhaust gas pipe 43 (exterior). It connects with the source 46 of gas supply which generates inert gas (for example, nitrogen N2 gas), respectively, and the flueing passage 50 is formed with the connector tubing 42 and an exhaust gas pipe 43, and the gas supply passage 51 is formed with the connector tubing 41, the ** gas pipe 44, and the closing motion valve 45. In addition, 52 is a detection sensor and the sealing container 10 detects whether it was certainly installed in the supply base 40 of a gas transfer unit 1. 53 is the container guide set up by the supply base 40.

[0015] And it is nitrogen N2 about the inside of the building envelope A of the sealing container 10. In order for gas to permute, If each of these gas-passageway tubing 20 and 21 is made in agreement with each in the connector tubing 41 and 42 and is laid in the supply base 40 of a gas transfer unit 5 by the operator in a clean room, or automatic conveyance which is not illustrated The gas-passageway tubing 20, the connector tubing 41 and the gas-passageway tubing 21, and the connector tubing 42 are connected to an airtight through the annular sealants 41A and 42A, respectively. Moreover, the detection sensor 50 detects whether the sealing container 10 was certainly laid in the supply base 40. After connecting each gas-passageway tubing 20 and 21 to each of the connector tubing 41 and 42, while operating the source 46 of gas supply Nitrogen N2 generated in this source 46 of gas supply when the closing motion valve 45 was changed into the open condition Gas the connector tubing 41 is supplied through the closing motion valve 45--** gas pipe 44 -- having -- this -- it supplies -- having -- nitrogen N2 Since the pressure of gas acts on spherical valve element 30B of an one-way valve 30, this spherical valve element 30 resists the spring force of a valve spring 23, stand ups from valve seat 30A, and an one-way valve 30 opens it. Thereby, it is nitrogen N2. Gas passes along an one-way valve 30, and is supplied in the building envelope A of the sealing container 10 through the gas-passageway tubing 20.

[0016] At this time, the building envelope A of the sealing container 10 is nitrogen N2. It is filled with gas and is nitrogen N2 in this space A. If gas becomes a predetermined pressure, the spring force of a valve spring 25 will be resisted, it will stand up from valve seat 31A, and an one-way valve 31 will open spherical valve element 31B of an one-way valve 31. Thereby, the

unnecessary gas (air, water, etc.) of the building envelope A of a container 10 is exhausted by the processor (exterior of the sealing container 10) which is not illustrated through the gas-passageway tubing 21, the connector tubing 42, an one-way valve 31, and an exhaust gas pipe 43. And it is the gas-passageway tubing 20 to nitrogen N2 in predetermined time amount. While supplying gas in the sealing container 10 By exhausting the unnecessary gas in the sealing container 10 (air, moisture, etc.) outside from the gas-passageway tubing 21, it is nitrogen N2 in the building envelope A of the sealing container 10. The permutation of gas is performed and it is made the environment which the concentration of unnecessary gas (air, water, etc.) was reduced, and was suitable for storage of the semi-conductor wafer W.

[0017] Subsequently, this nitrogen N2 While the permutation of gas is completed and suspending actuation of the source 46 of gas supply If the closing motion valve 45 is changed into a clausilium condition, while spherical valve 30B of an one direction 30 will sit down to valve seat 30A by the spring force of a valve spring 23 and an one-way valve 30 will close the valve the pressure in the building envelope A of the sealing container 10 -- constant value -- becoming (it being the same pressure about the spring force of a valve spring 25) -- spherical valve element 31B of an one-way valve 31 sits down to valve seat 31A by the spring force of a valve spring 25, an one-way valve 31 closes the valve, and the sealing container 10 is changed into a sealing condition. And by the operator in a clean room, or automatic conveyance which is not illustrated, the sealing container 10 is picked out from the supply base 40, and it conveys to the predetermined destination.

[0018] moreover, in laying and keeping the sealing container 10 to a gas transfer unit 5 Continue operating the source 46 of gas supply, and one-way valves 30 and 31 are changed into a valve-opening condition. They are always and nitrogen N2 during this storage. While continuing supplying gas in the sealing container 10 through the ** gas pipe 44-connector tubing 41-gas-passageway tubing 20 and an one-way valve 30 The gas-passageway tubing 21-one-way valve 31-connector tubing 42 and an exhaust gas pipe 43 are minded. By the time it exhausts unnecessary gas (air, moisture, etc.) to the exterior of the sealing container 10 one by one in the sealing container 10 and conveys the sealing container 10 to the predetermined destination The unnecessary gas (moisture and air) which it begins to emit in the sealing container 10 from the device section of a container inside and keylock 16 grade is exhausted to the exterior of the sealing container 10 one by one, and contamination of the semi-conductor wafer W is prevented.

[0019] It seems that in addition, each gas supply line 20 and the one-way valves 30 and 31 arranged in 21 are not limited to this, and may be shown in drawing 3 (a) and drawing 3 (b) in the gas supply system of the portable-type sealing container in this example. As shown in drawing 3 (a), in the gas-passageway tubing 20, this major-diameter pore 22B by batch member 30C used as the valve seat of an one-way valve 30 Namely, two space B While forming the umbrella-like valve element 55 formed by the plastics which divides to C and constitutes an one-way valve 30 in batch member 30C of the space B by the side of minor diameter pore 22A, or rubber material It is what formed two or more through-holes 56 which are open for free passage to the closed space D formed between batch member 30C by umbrella shaped part 55A of this umbrella-like valve element 55, and is nitrogen N2 from minor diameter pore 22C. Umbrella shaped part 55A of the umbrella-like valve element 55 stand ups from batch member 30C by gas, and it changes into a valve-opening condition. As shown in drawing 3 (b), in the gas-passageway tubing 21, this major-diameter pore 24B by batch member 31C used as the valve seat of an one-way valve 31 Moreover, two space E While forming the umbrella-like valve element 60 formed by the plastics which divides to F and constitutes an one-way valve 31 in batch member 31C of the space F by the side of minor diameter pore 24C, or rubber material It is what formed two or more through-holes 61 which are open for free passage to the closed space G formed between batch member 31C by umbrella shaped part 60A of this umbrella-like valve element 60, and is nitrogen N2 from minor diameter pore 24A. Umbrella shaped part 60A of the umbrella-like valve element 60 stand ups from batch member 31C by gas, and it changes into a valve-opening condition.

[0020] Moreover, it sets to the gas supply system of the portable-type sealing container in this example. Although he is trying to connect airtightly each gas-passageway tubing 20 and 21 and

each connector tubing 41 and 42 through the annular sealants 41A and 42A by laying each gas-passageway tubing 20 and 21 on each connector tubing 41 and 42 As it is not limited to this and shown in drawing 4 , while forming the hollow 65 which carries out opening to the end face of each connector tubing 41 and 42 and arranging the annular sealant 66 to inner skin 65a of this hollow 65 These narrow diameter portions 20A and 21A by fitting in in the hollow 65 of each connector tubing 41 and 42, respectively by forming in the point of each gas-passageway tubing 20 and 21 the narrow diameter portions 20A and 21A which can fit in in a hollow 65 the annular sealant 66 -- minding -- each gas-passageway tubing 20 and 21 and each connector tubing 41 and 42 -- ** -- it is made airtight and you may make it connect

[0021] Furthermore, the number of piping of the gas-passageway tubing 20 and 21 formed in the sealing container 10 and the gas transfer unit 5 and the connector tubing 41 and 42 is not limited to this.

[0022]

[Effect of the Invention] Thus, according to the gas supply system of the portable-type sealing container of this invention Each gas passageway of a sealing container is connected to each gas passageway of a gas transfer unit, respectively. Since inert gas can be supplied in a sealing container through an one-way valve from one gas passageway and the unnecessary gas in a sealing container (air, water, etc.) can be exhausted outside from the gas passageway of another side through an one-way valve Inert gas required in order to lower the unnecessary gas concentration in a sealing container is little. And in case exhaust air of the unnecessary gas can also be performed easily and inert gas is always supplied in a sealing container, while being able to reduce the contamination to a semi-conductor wafer economically Only by connecting each gas passageway of a sealing container to the gas passageway of a gas transfer unit, inert gas can be extremely permuted by ease and the short time.

[0023] Moreover, since penetration of the unnecessary gas (air, water, etc.) from this gas passageway to into a container can be prevented by clausilium actuation of an one-way valve prepared in each gas passageway when picking out a portable-type sealing container from a gas transfer unit and conveying it, it can prevent that the semi-conductor wafer in a sealing container is polluted.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing of longitudinal section showing the gas supply structure of a system of the portable-type sealing container in one example of this invention.

[Drawing 2] (a) And (b) is this invention. It is the important section enlarged drawing showing the configuration of the one-way valve of the gas supply system of the portable-type sealing container in an example.

[Drawing 3] (a) And (b) is the important section enlarged drawing showing the configuration of the modification of the one-way valve of the gas supply system of the portable-type sealing container in the example of this invention.

[Drawing 4] It is the important section enlarged drawing showing the modification of the connection structure of gas-passageway tubing of the gas supply system of a portable-type sealing container and connector tubing in the example of this invention.

[Description of Notations]

5 Gas Transfer Unit

10 Portable-Type Sealing Container

20 21 Gas-passageway tubing

30 31 One-way valve

50 51 Gas passageway

[Translation done.]

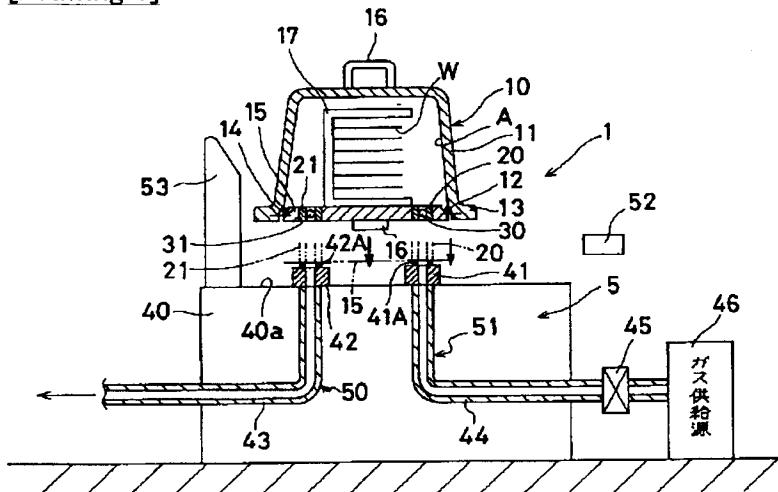
* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. *** shows the word which can not be translated.
3. In the drawings, any words are not translated.

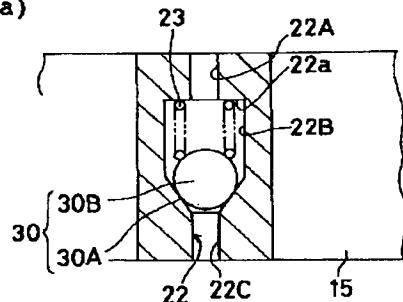
DRAWINGS

[Drawing 1]

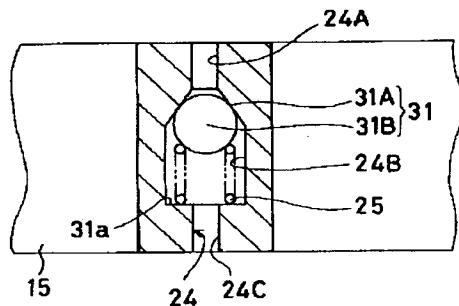


[Drawing 2]

(a)

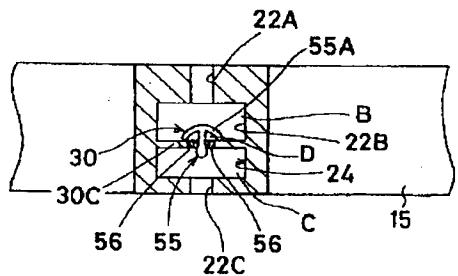


(b)

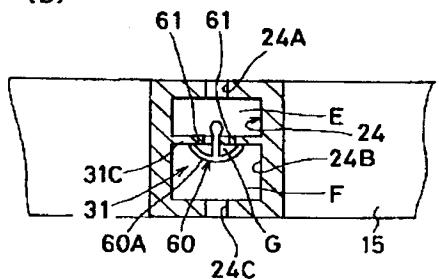


[Drawing 3]

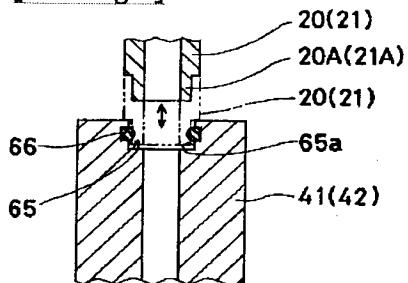
(a)



(b)



[Drawing 4]



[Translation done.]

1

【特許請求の範囲】

【請求項1】 半導体ウエハを収納し内部を不活性ガス雰囲気に密閉される可搬式密閉コンテナと、この可搬式密閉コンテナの内部に不活性ガスを供給／排気するガス供給装置とを備えてなる可搬式密閉コンテナのガス供給システムにおいて、

前記密閉コンテナには、この内部と外部とを連通する複数のガス通路に互いに反する方向に前記不活性ガスの流れを許容する一方方向弁をそれぞれ設けると共に、前記ガス供給装置には、前記各ガス通路に対応して接離可能にされたガス流路を形成したことを特徴とする可搬式密閉コンテナのガス供給システム。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、クリーンルームに用いられる可搬式密閉コンテナ内を不活性ガスで置換するための、可搬式密閉コンテナのガス供給システムに関する。

【0002】

【従来の技術】 例えば、半導体の製造は、内部雰囲気を清浄化したクリーンルーム内において行われるが、クリーンルーム内の工程間の搬送は、半導体ウエハへの塵埃の付着を防ぐために当該半導体ウエハを収納したウエハカセットを可搬式の密閉コンテナに収納して行う。更に、近年、半導体ウエハの自然酸化による酸化膜の成長を防止するために、この密閉コンテナの内部雰囲気を窒素N₂ガス等の不活性ガスで置換するようにしている。

【0003】 このように、近年では、窒素N₂ガスを充満した密閉コンテナにウエハカセットを入れて搬送・保管するようにしているが、密閉コンテナ内の窒素N₂ガスの濃度は、搬送待機中や保管中に規定値以下に低下してしまう場合があり、このような場合、従来は、窒素N₂ガスの濃度が低下した密閉コンテナをクリーンルーム内に設けたガスバージステーションへ搬送して、ここで再バージしたのち元の場所に戻す等していたので、無駄な搬送を行なわなくてはならず、かつ密閉コンテナの保管が複雑になるという問題があった。

【0004】

【発明が解決しようとする課題】 この問題を解決するために、本願発明の発明者は、特願平4-128850号に記載の可搬式密閉コンテナのガス供給システムを提案している。この可搬式密閉コンテナのガス供給システムは、内部に空間を有するバージボックスと、このバージボックスの開口内に嵌入して当該開口をボックス内側から密閉している昇降台と、バージボックス内部に開口する給ガス管及び排ガス管を主要部とし、バージボックスの開口を密閉状態にして錠機構付きの密閉コンテナが載置されている。そして、密閉コンテナ内の不活性ガス

(例えば、窒素N₂ガス)の濃度が低下すると、このコンテナの錠機構を解除して蓋を、昇降台側へ若干だけ変

位させて、供給ガスから窒素N₂ガスを、バージボックスの内部空間内、及びコンテナ内に流入するとともに、これらの内部の気体を排ガス管を通して外部へ追い出すことにより、コンテナ内の窒素N₂ガスを高い濃度のガスに置換(再バージ)した後、再び、錠機構で蓋を施錠してコンテナ内を密閉状態にするものである。

【0005】 しかしながら、従来技術の可搬式密閉コンテナのガス供給システムでは、密閉コンテナ内を濃度の高い窒素N₂ガスで置換した後、蓋を施錠して密閉状態で保管しておいても、コンテナ内面、錠機構等の機構部から吸着物(不純物)がコンテナ内に放出をはじめ水分、酸素濃度が上昇し、半導体ウエハが汚染されるという問題があった。

【0006】 この問題を解決するために、給ガス管から連続的に窒素N₂ガスを、供給しつづけることも考えられるが、コンテナ以外のバージボックスの空間が大きく、不要ガス濃度を下げるためには、置換用純粋窒素N₂ガスが大量に必要となり、その不要ガスの排気も容易に行えず窒素N₂ガスの置換に長時間かかり、また、バージボックス分だけガス供給システムが大型化して不経済なものとなる。

【0007】 本発明は、この問題を解決するためになされたもので、経済的に一定量の置換ガスを常時流すことにより、密閉コンテナ内の半導体ウエハへの汚染を低減することのできる可搬式密閉コンテナのガス供給システムを提供することを目的とする。

【0008】

【課題を解決するための手段】 上記問題を解決するため、本発明の可搬式密閉コンテナのガス供給システムでは、半導体ウエハを収納し内部を不活性ガス雰囲気に密閉される可搬式密閉コンテナと、この可搬式密閉コンテナの内部に不活性ガスを供給／排気するガス供給装置とを備えてなる可搬式密閉コンテナのガス供給システムにおいて、前記密閉コンテナには、この内部と外部とを連通する複数のガス通路に互いに反する方向に前記不活性ガスの流れを許容する一方方向弁をそれぞれ設けると共に、前記ガス供給装置には、前記各ガス通路に対応して接離可能にされたガス流路を形成したものである。

【0009】

【作用】 このように本発明の可搬式密閉コンテナのガス供給システムでは、密閉コンテナの各ガス通路を、ガス供給装置の各ガス流路にそれぞれ接続して、一方のガス流路から一方方向弁を介して不活性ガスを密閉コンテナ内に供給し、一方方向弁を介して他方のガス流路から密閉コンテナ内の不要ガス(空気・水等)を外部に排気することができ、また、密閉コンテナの各ガス通路をガス供給装置のガス流路に接続するだけで、極めて容易、且つ短時間に不活性ガスの置換を行うことができる。

【0010】 また、可搬式密閉コンテナを、ガス供給装置から取り出して搬送する場合には、各ガス通路に設け

られた一方向弁の閉弁作動により、このガス通路からコンテナ内への不要ガス（空気・水等）の進入を阻止することができる。

【0011】

【実施例】以下、本発明の一実施例である可搬式密閉コンテナのガス供給システムを図面を参照して説明する。図1は本実施例における可搬式密閉コンテナのガス供給システムの構成を示す縦断面図、図2（a）及び（b）は本実施例における可搬式密閉コンテナのガス供給システムの一方向弁の構成を示す要部拡大図である。

【0012】図1において、1はクリーンルーム内の所定場所に配置された可搬式密閉コンテナのガス供給システムであって、ガス供給装置5と可搬式の密閉コンテナ10とを主要部としている。11は密閉コンテナ（POD）10の本体であって、この開口部12にはフランジ13が設けられている。また、密閉コンテナ10の開口部12内には、環状シール材14を介して蓋15が嵌合されているとともに、この蓋15に設けられた蓋錠機構16を施錠することにより密閉コンテナ10の内部空間Aを密閉状態にしている。また、この蓋15には、所定半径を有する周方向に所定の間隔を隔てて（180度の位相を持って）、密閉コンテナ10の内部空間Aと外部とを連通するガス通路管20、21が設けられている。各ガス通路管20、21は、互いに並行して蓋15を貫通して延びており（蓋15の厚さを貫通して延びている。）、これらの内部には、一方向弁（逆止弁）30、31がそれぞれ配置されている。16は密閉コンテナ10の外部に設けられた把手である。17は半導体ウェハWを収納したウェハカセットであって、密閉コンテナ10の内部空間A内の蓋15上に各ガス通路管20、21を塞ぐことなく載置されている。

【0013】ガス通路管20には、図2（a）に示すように、蓋15から端部側に向かって小径孔22A、大径孔22B及び小径孔22Cが順々に連続する段付孔22が形成されており、この大径孔22Bと小径孔22Cとをつなぐ傾斜面を、一方向弁30の弁座30Aとして球状弁体30Bが着座している。この一方向弁30の球状弁体30Bは、大径孔22Bの段部22aとの間に張設された弁ばね23で弁座30Aに付勢されている。これにより、一方向弁30は、密閉コンテナ10外部から内部空間A内への不活性ガス（窒素N₂ガス）の流れを許容し、その逆を阻止するようになっている。また、ガス通路管21には、図2（b）に示すように、蓋15から端部側に向かって小径孔24A、大径孔24B及び小径孔24Cが順々に連続する段付孔24が形成されており、この大径孔24Bと小径孔24Aとをつなぐ傾斜面を、一方向弁31の弁座31Aとして球状弁体31Bが着座している。この一方向弁31の球状弁体31Bは、大径孔31Bの段部31aとの間に張設された弁ばね25で弁座31Aに付勢されている。これにより、一方向

弁31は、密閉コンテナ10の内部空間Aから外部への窒素ガスN₂ガスの流れを許容し、その逆を阻止するようになっている。

【0014】40はガス供給装置5の供給台であって、この上面40aには、ガス供給管20、21と同一半径を有する周方向に所定の間隔を隔てて（180度の位相を持って）、コネクタ管41と42がそれぞれ突出しており、この各コネクタ管41、42端には、環状シール材41A、42Aがそれぞれ設けられている。このコネクタ管42は排ガス管43を介して、図示しない処理装置（外部）に、コネクタ管42は給ガス管44及び開閉弁45を介して、不活性ガス（例えば、窒素N₂ガス）を生成するガス供給源46にそれぞれ接続されており、コネクタ管42と排ガス管43とでガス排気流路50を、コネクタ管41と給ガス管44、開閉弁45とでガス供給流路51を形成している。尚、52は検知センサであって、密閉コンテナ10がガス供給装置1の供給台40に確実に設置されたかを検知するものである。53は供給台40に立設されたコンテナガイドである。

【0015】そして、密閉コンテナ10の内部空間A内を窒素N₂ガスで置換するため、クリーンルーム内の作業者又は図示しない自動搬送により、この各ガス通路管20、21をコネクタ管41、42にそれぞれに一致させてガス供給装置5の供給台40に載置すると、ガス通路管20とコネクタ管41、ガス通路管21とコネクタ管42とが環状シール材41A、42Aを介してそれぞれ気密に接続される。また、検知センサ50は、密閉コンテナ10が供給台40に確実に載置されたか否かを検知する。各ガス通路管20、21をコネクタ管41、42のそれぞれに接続した後、ガス供給源46を作動させるとともに、開閉弁45を開状態にすると、このガス供給源46で生成された窒素N₂ガスが、開閉弁45—給ガス管44を介してコネクタ管41に供給され、この供給され窒素N₂ガスの圧力が一方向弁30の球状弁体30Bに作用するので、この球状弁体30は弁ばね23のばね力に抗して弁座30Aから離座して、一方向弁30が開弁する。これにより、窒素N₂ガスが一方向弁30を通って、ガス通路管20を介して密閉コンテナ10の内部空間A内に供給される。

【0016】このとき、密閉コンテナ10の内部空間Aが窒素N₂ガスで充満され、この空間A内の窒素N₂ガスが所定圧力になると、一方向弁31の球状弁体31Bを弁ばね25のばね力に抗して弁座31Aから離座して、一方向弁31が開弁する。これにより、コンテナ10の内部空間Aの不要ガス（空気・水等）がガス通路管21、コネクタ管42、一方向弁31及び排ガス管43を介して、図示しない処理装置（密閉コンテナ10の外部）に排気される。そして、所定の時間中に、ガス通路管20から窒素N₂ガスを密閉コンテナ10内に供給するとともに、ガス通路管21から密閉コンテナ10内の

不要ガス（空気・水分等）を外部に排気することにより、密閉コンテナ10の内部空間A内の窒素N₂ガスの置換が行われ、不要ガス（空気・水等）の濃度を低下させて半導体ウエハWの保管に適した環境にする。

【0017】次いで、この窒素N₂ガスの置換が完了して、ガス供給源46の作動を停止するとともに、開閉弁45を閉弁状態にすると、一方向30の球状弁30Bが弁ばね23のばね力で弁座30Aに着座して、一方向弁30が閉弁するとともに、密閉コンテナ10の内部空間A内の圧力が一定値になる（弁ばね25のばね力を同じ圧力）と、一方向弁31の球状弁体31Bが弁ばね25のばね力で弁座31Aに着座して、一方向弁31が閉弁して、密閉コンテナ10を密閉状態にする。そして、クリーンルーム内の作業者又は図示しない自動搬送により、密閉コンテナ10を供給台40から取り出して所定の目的地に搬送する。

【0018】また、密閉コンテナ10をガス供給装置5に載置して保管する場合には、ガス供給源46を作動しつづけ、一方向弁30、31を開弁状態にして、この保管中に常時、窒素N₂ガスを給ガス管44—コネクタ管41—ガス通路管20及び一方向弁30を介して密閉コンテナ10内に供給し続けるとともに、ガス通路管21—一方向弁31—コネクタ管42及び排ガス管43を介して、密閉コンテナ10内に不要ガス（空気・水分等）を順次、密閉コンテナ10の外部に排気して、密閉コンテナ10を所定の目的地に搬送するまでの間に、コンテナ内面、錐機構16等の機構部から密閉コンテナ10内に放出しはじめる不要ガス（水分・空気）を、順次、密閉コンテナ10の外部に排気して半導体ウエハWの汚染を防止する。

【0019】尚、本実施例における可搬式密閉コンテナのガス供給システムにおいて、各ガス供給管20、21内に配置された一方向弁30、31は、これに限定されるものでなく、図3(a)及び図3(b)に示すようなものであってもよい。即ち、ガス通路管20内には、図3(a)に示すように、この大径孔部22Bを一方向弁30の弁座となる仕切部材30Cで2つの空間B、Cに区画し、小径孔部22A側の空間Bの仕切部材30Cに、一方向弁30を構成するプラスチックやゴム材で形成された傘状弁体55を設けるとともに、この傘状弁体55の傘状部55Aで仕切部材30Cとの間に形成された密閉空間Dに連通する複数の通孔56を設けたもので、小径孔部22Cからの窒素N₂ガスにより傘状弁体55の傘状部55Aが仕切部材30Cから離座して開弁状態にする。また、ガス通路管21内には、図3(b)に示すように、この大径孔部24Bを一方向弁31の弁座となる仕切部材31Cで2つの空間E、Fに区画し、小径孔部24C側の空間Fの仕切部材31Cに、一方向弁31を構成するプラスチックやゴム材で形成された傘状弁体60を設けるとともに、この傘状弁体60の傘状部60A

部60Aで仕切部材31Cとの間に形成された密閉空間Gに連通する複数の通孔61を設けたもので、小径孔部24Aからの窒素N₂ガスにより傘状弁体60の傘状部60Aが仕切部材31Cから離座して開弁状態にする。

【0020】また、本実施例における可搬式密閉コンテナのガス供給システムにおいて、各ガス通路管20、21を各コネクタ管41、42上に載置することにより、環状シール材41A、42Aを介して各ガス通路管20、21と各コネクタ管41、42を気密に接続するようしているが、これに限定されるものでなく、図4に示すように、各コネクタ管41、42の端面に開口する凹所65を形成して、この凹所65の内周面65aに環状シール材66を配置するとともに、各ガス通路管20、21の先端部に凹所65内に嵌合可能な小径部20A、21Aを形成して、この小径部20A、21Aを各コネクタ管41、42の凹所65内にそれぞれ嵌合することにより、環状シール材66を介して各ガス通路管20、21と各コネクタ管41、42をと気密にして接続するようにしたものであってもよい。

【0021】更に、密閉コンテナ10及びガス供給装置5に設けられた、ガス通路管20、21及びコネクタ管41、42の配管数は、これに限定されるものでない。

【0022】

【発明の効果】このように本発明の可搬式密閉コンテナのガス供給システムによれば、密閉コンテナの各ガス通路を、ガス供給装置の各ガス流路にそれぞれ接続して、一方のガス流路から一方向弁を介して不活性ガスを密閉コンテナ内に供給し、一方向弁を介して他方のガス流路から密閉コンテナ内の不要ガス（空気・水等）を外部に排気することができるので、密閉コンテナ内の不要ガス濃度を下げるために必要な不活性ガスが少量で、且つその不要ガスの排気も容易に行うことができ、また、常時、不活性ガスを密閉コンテナ内に供給する際ににおいても経済的に半導体ウエハへの汚染を低減することができるとともに、密閉コンテナの各ガス通路をガス供給装置のガス流路に接続するだけで、極めて容易、且つ短時間に不活性ガスの置換を行うことができる。

【0023】また、可搬式密閉コンテナを、ガス供給装置から取り出して搬送する場合には、各ガス通路に設けられた一方向弁の閉弁作動により、このガス通路からコンテナ内への不要ガス（空気・水等）の進入を阻止することができるので、密閉コンテナ内の半導体ウエハが汚染されることを防止することができる。

【図面の簡単な説明】

【図1】本発明の一実施例における可搬式密閉コンテナのガス供給システムの構成を示す縦断面図である。

【図2】(a)及び(b)は本発明の一実施例における可搬式密閉コンテナのガス供給システムの一方向弁の構成を示す要部拡大図である。

【図3】(a)及び(b)は本発明の一実施例における可

7

搬式密閉コンテナのガス供給システムの一方向弁の変形例の構成を示す要部拡大図である。

【図4】本発明の実施例における可搬式密閉コンテナのガス供給システムのガス通路管とコネクタ管との接続構造の変形例を示す要部拡大図である。

【符号の説明】

5 ガス供給装置

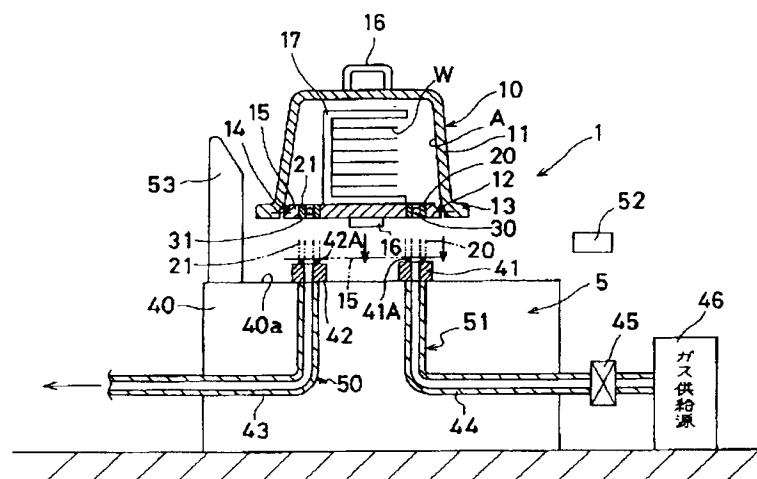
10 可搬式密閉コンテナ

20、21 ガス通路管

30、31 一方向弁

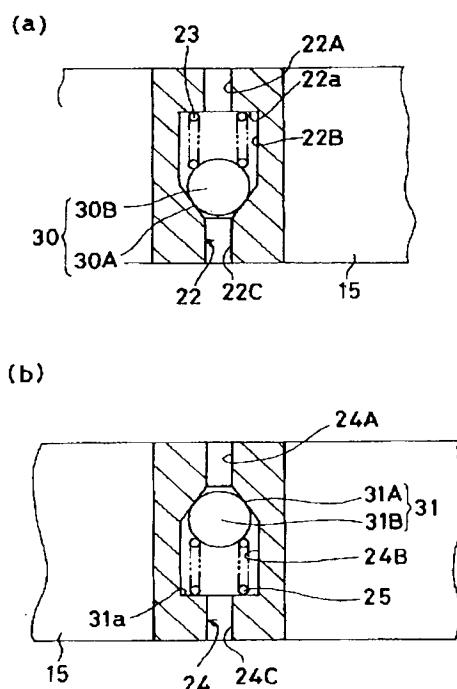
50、51 ガス流路

[图 1]

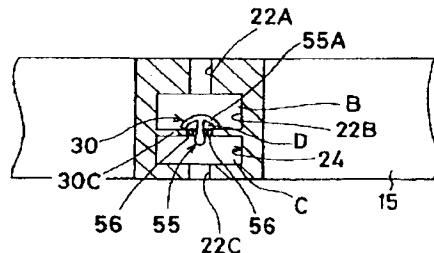


[図3]

[图2]

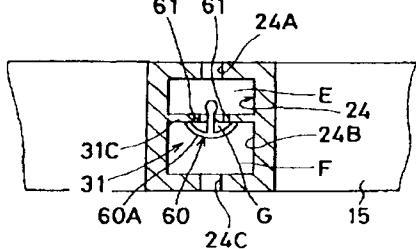


(a)



[图 4]

(b)



フロントページの続き

(72) 発明者 森田 日也
三重県伊勢市竹ヶ鼻町100番地 神鋼電機
株式会社伊勢製作所内